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Electron and Ion Reactions with ClN_3 THOMAS M. MILLER, NICOLE EYET, KEITH FREEL, JEFFREY F. FRIEDMAN, MICHAEL C. HEAVEN, A.A. VIGGIANO, Air Force Research Laboratory — Since its first synthesis in 1908, there have been relatively few studies addressing chemistry of ClN_3 and none regarding electron and ion reactions with ClN_3 , probably because of the extremely explosive character of the compound. There are 4 exothermic channels in electron attachment to ClN_3 , but only the Cl^- channel was observed to occur at 298 and 400 K in the present work. Electron attachment rates were measured to be 3.5×10^{-8} and $4.5 \times 10^{-8} \text{ cm}^3 \text{ s}^{-1}$ at 298 K and 400 K, $\pm 35\%$, using a FALP apparatus. The activation energy for the reaction is $24 \pm 10 \text{ meV}$. The reactivity of ClN_3 with 17 negative ions and 21 positive ions has been investigated at 300 K using a SIFT apparatus. The electron affinity, ($2.48 \pm 0.20 \text{ eV}$), proton affinity ($713 \pm 41 \text{ kJ mol}^{-1}$), and ionization energy ($> 9.6 \text{ eV}$) of ClN_3 were bracketed. These measurements are in agreement with results from G3 calculations. For negative ion reactions, the major product of the reactions was Cl^- , while charge transfer, N_3^- production and O atom incorporation were also observed. Reactions of positive ions often resulted in dissociative charge transfer forming NCl^+ product.

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